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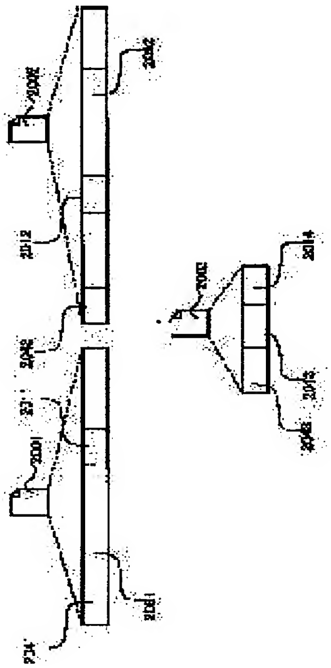
(54) DATA EDITING METHOD AND DATA RECORDING MEDIUM

(57)Abstract:

PROBLEM TO BE SOLVED: To control reencoded data associated with a nondestructive editing by using a small number of files.

SOLUTION: A data editing method is proposed by which management information which controls a method of reproducing one or more of the first files which store data existing on a recording medium is recorded on the second file and data associated with the existing data are recorded. The associated data and management information are stored in the same file by using the data editing method. The associated data are defined as reencoded data included in the first file, or data reproduced in synchronism with the data included in the first file.



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CLAIMS

[Claim(s)]
[Claim 1]Management information which manages a regeneration method of the 1st one or more file that stored the existing data on a recording medium is recorded on the 2nd file, A data-editing method which is the data-editing method which records data related with said existing data, and is characterized by storing said associated data and said management information in the same file.
[Claim 2]Management information which manages a regeneration method of the 1st one or more file that stored the existing data on a recording medium is recorded on the 2nd file, A data-editing method which is the data-editing method which records data related with said existing data, and is characterized by arranging said associated data and said management information the neighborhood [on said recording medium].
[Claim 3]A data-editing method characterized by said associated data being the data which re-encoded data contained in the 1st file in said data-editing method according to claim 1 or 2.
[Claim 4]A data-editing method characterized by said associated data being data contained in the 1st file, and data which carries out synchronous reproduction in said data-editing method according to claim 1 or 2.
[Claim 5]The 1st one or more file that stored data, and the 2nd file that stores management information which manages a regeneration method of said 1st file, A data recording medium which is a data recording medium with which data related with said 1st file was recorded, and is characterized by storing data related with said 1st file in said 2nd file.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the data-editing method of recording and editing picture image data and voice data, to the recording medium in which random access, such as a hard disk and an optical disc, is possible.
[0002]
[Description of the Prior Art]The digital recording playback equipment (it is hereafter called a video disc recorder) of the video using a disk medium is spreading. As a feature function in the disk medium which is not in a tape medium, there are some which are called a non-destroying edit function or a non-linear-editing function. The arbitrary sections (scene) of an AV stream are [this function] renewable in arbitrary turn, without moving or copying the AV stream recorded on the disk, It realizes by making the information (reproduction control information) which shows in what kind of turn it reproduces, and reproducing according to the information from where of an AV stream to where.

[0003]Generally, MPEG-2 is used for compression of the video in a video disc recorder. In MPEG-2, GOP (Group Of Pictures) comprises two or more frames (generally about 15 frames), and decoding is carried out to GOP units. Therefore, when the frame in the middle of GOP is specified as a scene reproduction start frame, in non-destroying edit, it is necessary to decode from the head of GOP where a scene reproduction start frame is contained, and to control the decoded result to the frame in front of a scene reproduction start frame to cancel.

[0004]In this case, the data of a frame canceled is also sent to a decoder, in order to decode, near a scene reproduction start frame, the data transfer quantity to the decoder per unit time and the throughput of a decoder become higher than other parts, and there is a possibility that processing may not fulfill demand but a way piece may arise in reproduction. When it is a frame in the middle of the specified end frame of scene reproduction being GOP, it is necessary to control to close decoding after the end frame of scene reproduction. That is, complicated control will be required, when it does not break off and is going to reproduce the non-destroying edit result as which the knot was specified per frame.

[0005]In order to solve such a problem, on the other hand, law is indicated by JP,2001-157145,A. Hereafter, the outline is explained using drawing 29 and drawing 30. As here shown in drawing 29, when there are the files 3001 and 3002 in which the video stream is stored, First, it assumes carrying out non-destroying edit of reproducing the file 3001 to the frame 3021 in GOP3011, next reproducing the file 3002 from the frame 3022 in GOP3012.

[0006]At this time, by conventional technology, decode GOP3011 and The frame sequence 3031 to the frame 3021, GOP3012 is decoded, the frame sequence 3032 from the frame 3022 is connected, the frame sequence 3033 is made, and the result of having encoded it is stored in the file 3003. This encoding is called re-encoding. The information for managing those reproduction orders and reproducing sections is stored in the file 3003 as shown in drawing 30.

[0007]Reproduction is not carried out based on the information stored in the file 3003, What is necessary is just to send to the data 3041 of a just before [GOP3011 of the file 3001], and the next at all the data 3042 of the file 3003, and the last, and to send the data 3043 just behind

GOP3012 of the file 3002 to a decoder in order, A decoded result is not canceled or complicated control like the close of decoding is not needed. It is because only the frame data which displays is contained in the video stream sent to a decoder and it is making.

[0008]

[Problem(s) to be Solved by the Invention]However, in the conventional technology mentioned above, it is necessary to create a file for every one knot. In the used file system, the number of files which can be treated may be restricted and the number of the non-destroying edit results which a user can create in that case decreases.

[0009]This invention is made in view of an aforementioned problem, and is a thing.

The purpose is to provide the data-editing method which can manage the re-encoding section which can sometimes be set with the small number of files.

[0010]

[Means for Solving the Problem]An invention of the 1st of this application records management information which manages a regeneration method of the 1st one or more file that stored the existing data on a recording medium on the 2nd file, It is the data-editing method which records data related with said existing data, and said associated data and said management information are stored in the same file.

[0011]An invention of the 2nd of this application records management information which manages a regeneration method of the 1st one or more file that stored the existing data on a recording medium on the 2nd file, It is the data-editing method which records data related with said existing data, and said associated data and said management information are arranged the neighborhood [on said recording medium].

[0012]An invention of the 3rd of this application is characterized by said associated data being the data which re-encoded data contained in the 1st file.

[0013]An invention of the 4th of this application is characterized by said associated data being data contained in the 1st file, and data which carries out synchronous reproduction.

[0014]The 1st one or more file in which the 5th invention of this application stored data, The 2nd file that stores management information which manages a regeneration method of said 1st file, It is the data recording medium with which data related with said 1st file was recorded, and data related with said 1st file is stored in said 2nd file.

[0015]

[Embodiment of the Invention]Hereafter, the embodiment of this invention is described in detail, referring to drawings. Explanation here is given in order called the composition used in common in this invention, and contents peculiar to each embodiment.

[0016]<System configuration> drawing 1 is a lineblock diagram of the video disc recorder which can be postrecorded used in common in this invention. As shown in drawing 1, this device, The bus 100, the host CPU 101, RAM102, ROM103, the user interface 104, the system clock 105, the optical disc 106, the pickup 107, the ECC (Error Correcting Coding) decoder 108, ECC encoder 109, the buffer 110 for reproduction, the buffer 111 for record/postrecording, the demultiplexer 112, the multiplexer 113, the buffer 114 for multiplexing, the audio decoder 115, the video decoder 116, the audio encoder 117, It comprises the video encoder 118 and a camera which is not illustrated, a microphone, a loudspeaker, a display, etc.

[0017]the host CPU 101 leads the bus 100 -- the demultiplexer 112, the multiplexer 113, and the pickup 107 -- although not illustrated, communication with the audio decoder 115, the video decoder 116, the audio encoder 117, and the video encoder 118 is performed.

[0018]At the time of playback, the error correction of the data read from the optical disc 106 through the pickup 107 is carried out by ECC decoders 108, and it is once stored in the buffer 110 for playback. The demultiplexer 112 distributes the data in the buffer for reproduction to a suitable decoder by the classification according to the data transmission request from the audio decoder 115 and the video decoder 116.

[0019]On the other hand, at the time of record, the data by which compression encoding was carried out with the audio encoder 117 and the video encoder 118 is once sent to the buffer 114 for multiplexing, and AV multiplexing is carried out by the multiplexer 113 and it is sent to the buffer 111 for record/postrecording. By ECC encoder 109, an error correcting code is added to the data in the buffer 111 for record/postrecording, and it is recorded on the optical disc 106 through the pickup 107.

[0020]MPEG-1 Layer-II is used for the coding mode of audio information, and MPEG-2 is used for the coding mode of a video data, respectively.

[0021]Let the optical disc 106 be an optical disc in which record reproduction is spirally performed toward inner circumference from a periphery and which can be desorbed. 2048 bytes is used as one sector and an ECC block consists of 16 sectors for an error correction. When rewriting the data in an ECC block, it is necessary to read the whole ECC block in which the data is contained, to perform an error correction, and to rewrite the target data, and it necessary to add an error correcting code again, to constitute an ECC block, and to record on a recording medium. In order that the optical disc 106 may raise recording efficiency, ZCAV (zone constant angular velocity) is adopted, and a record section comprises several zones where number of rotations differs.

[0022]A file system is used in order to manage the variety of information on the <file system> optical disc 106. In consideration of interoperability with a personal computer (PC), UDF (Universal Disk Format) is used for a file system. On a file system, various management information and an AV stream are treated as a file.

[0023]User area is managed by 2048 bytes of logical block (a sector and a one to one correspondence). Each file comprises an extent (continuous logical block) of integer pieces, and it may distribute per extent and it may be recorded. Free space is managed per logical block using Space Bitmap.

[0024]A QuickTime file format is used as a format for <file format> AV stream management. A QuickTime file format is a format for multimedia data management which Apple developed, and it is used widely in the world of PC.

[0025]A QuickTime file format comprises a video data, audio information (these are named generically and it is also called media data), etc. and management information. Both are doubled and it is called a QuickTime movie (carrying out abbreviated movie) here. Both may exist in the same file or may exist in a separate file.

[0026]When it exists in the same file, composition as shown in drawing 2 (a) is taken. A variety of information is stored in a common structure of atom. Management information is stored in the structure of Movie atom, and an AV stream is stored in the structure of Movie data atom. The table for drawing the relative position of a under [the file of the AV information corresponding to the arbitrary time in media data], the attribution information of media data, the external reference information mentioned later, etc. are included in the management information in Movieatom.

[0027]On the other hand, when management information and media data are stored in a separate file, composition as shown in drawing 2 (b) is taken. An AV stream does not need to be stored in atom although management information is stored in the structure of Movie atom. At this time, it is said that Movie atom is carrying out "external reference" of the file which stored the AV stream.

[0028]External reference can be carried out to two or more AV stream files, as shown in drawing 2 (c), and what is called "non-linear editing" and "non-destroying edit" which are shown as edited seemingly are attained according to this structure, without moving the AV stream itself physically.

[0029]Then, the format of the management information of QuickTime is explained using drawing 3 thru/or drawing 12. First, atom which is a common information storing format is explained. At the head of atom, Atom size which is the size of the atom, and Type which is the type information of the atom certainly exist. Type is distinguished by four characters, for example, it is set to 'moov' in Movie atom, and it serves as 'mdat' in Movie data atom.

[0030]Each atom can contain another atom. That is, a layered structure is between atom(s). The composition of Movie atom is shown in drawing 3. Movie header atom manages the overall attribute of the movie which the Movie atom manages. Trackatom stores the information about tracks included in the movie, such as video and an audio. User data atom is atom which can be defined uniquely.

[0031]The composition of Track atom is shown in drawing 4. Track header atom manages the overall attribute of the track. Edit atom manages which section of media data is reproduced in which timing of a movie. Track reference atom manages a relation with another track. Media atom manages data called actual video and audio.

[0032]The composition of Track header atom is shown in drawing 5. Here, only a thing required for next explanation is explained. flags is a set of the flag which shows an attribute. There is a Track enabled flag, as a typical thing, if this flag is 1, that track will be reproduced, and it will not be reproduced if it is 0. layer expresses the spatial priority of the track and a picture is displayed for the track where the value of layer with plurality is [the track which displays a picture] smaller on a front face.

[0033]The composition of Media atom is shown in drawing 6. Media header atom manages the overall attribute about the media data which the Media atom manages, etc. Handler referenceatom stores the information which shows by which decoder media data is decoded. Media information atom manages attribution information peculiar to media, such as video and an audio.

[0034]The composition of Media information atom is shown in drawing 7. Media information header atom manages attribution information peculiar to media, such as video and an audio. Handler reference atom is as the paragraph of Media atom having explained. Data information atom contains Data reference atom which is atom which manages the name of the file containing the media data which the QuickTime movie refers to. Sample table atom has managed size, regeneration time, etc. of data.

[0035]Next, although Sample table atom is explained, the controlling method of the data in QuickTime is explained before that using drawing 8. In QuickTime, the minimum unit (for example, video frame) of data is called a sample. The sample is numbered from 1 in order of regeneration time for each track of every (sample number).

[0036]In the QuickTime format, each regeneration time length and data size of a sample are managed. The sample belonging to the same track calls a chunk the field continuously arranged in a file at the order of regeneration time. The chunk is also numbered from 1 in order of regeneration time.

[0037]In the QuickTime format, the sample number which each address and each chunk from the file head of a chunk contain is managed. It is possible to search for the position of the sample corresponding to arbitrary time based on these information.

[0038]The composition of Sample table atom is shown in drawing 9. Sample description atom manages Index etc. of the chunk of the file in which each data format (Data format) and sample of the chunk are stored. Time-to-sample atom manages the regeneration time of each sample.

[0039]Sync sample atom manages the sample in which a decoding start is possible among each samples. Sample-to-chunk atom manages the sample number contained in each chunk. Sample size atom manages the size of each sample. Chunk offset atom manages the address from the file head of each chunk.

[0040]Edit atom contains one Edit list atom, as shown in drawing 10. Edit listatom has a group (entry) of the value of Track duration for the number specified by Number of entries, Media time, and Media rate. On the track, each entry corresponded to the section reproduced continuously, and is located in a line in order of the regeneration time on the track.

[0041]The regeneration time on the track of the section when the entry manages Track duration, the position on the media data corresponding to the head of the section when the entry manages Media time, and Media rate express the reproduction speed of the section which the entry manages. When Media time is -1, reproduction of the sample in a part for Track duration of the entry and its track is suspended. This section is called empty edit.

[0042]The example of use of Edit list is shown in drawing 11. Here, the contents of Edit list atom are contents shown in drawing 11 (a), and suppose that the composition of the sample was drawing 11 (b) further. Here, D(i) and Media time are made into T(i) and Media rate is made into R(i) for Track duration of the i-th entry. At this time, reproduction of a actual sample is performed in the order shown in drawing 11 (c). This is explained briefly.

[0043]First, since 13000 and Media time are [20000 and Media rate] 1 entry #1 in Track duration, the section of 13000 reproduces the section of the time 20000-33000 in a sample from the head of the track. Next, since Track duration is [5000 and Mediatime] -1, as for the section of the time 13000-18000 in a track, and nothing, entry #2 is reproduced.

[0044]Finally, since 10000 and Media time are [0 and Media rate] 1, in the section of the time 18000-28000 in a track, as for entry #3, Track duration reproduces the section of the time 0-10000 in a sample.

[0045]The composition of User data atom is shown in drawing 12. Arbitrary number storing of the original information which is not defined by QuickTime format can be carried out at this atom. One original information is managed by one entry, and one entry comprises Size, Type, and User data. Size expresses the size of the entry itself and identification information for Type to distinguish original information, respectively and User data express actual data.

[0046]<the gestalt of an AV stream> -- the composition of the AV stream in this example is first explained using drawing 13 and drawing 14. An AV stream comprises Record Unit (RU) of integer pieces. RU is a unit continuously recorded on a disk. The length of RU, RU which constitutes an AV stream is arranged on a disk how. It is set up so that ** seamless playback (it can play without a picture and a sound breaking off during playback), and real-time postrecording (record an audio, carrying out seamless playback of the video for postrecording) may be guaranteed. This setting method is mentioned later.

[0047]A stream is constituted so that RU boundary may be in agreement with an ECC block boundary. Arrangement of RU unit can be easily changed on a disk, guaranteeing seamless playback with these character of RU, even after recording an AV stream on a disk.

[0048]RU comprises Video Unit (VU) of integer pieces. VU is an independent refreshable unit and can serve as an entry point in the case of reproduction from that.

[0049]VU composition is shown in drawing 14. VU comprises GOP (group OBU picture) of the integer pieces which stored the video data for about 1 second, and AAU (audio access unit) of the integer pieces which stored the main audio information reproduced at the same time as them.

[0050]GOP is a unit of the graphical data compression in MPEG-2 video standard, and comprises two or more video frames (typically about 15 frames). AAU is a unit of the speech compression in an MPEG-1 Layer-II standard, and is constituted by the sound-wave-forms sample point of 1152 points. When a sampling frequency is 48 kHz, the regeneration time per AAU will be 0.024 second. In VU, in order to make small delay which is needed for AV synchronous reproduction, it arranges in order of AAUGOP.

[0051]In order to enable independent reproduction per VU, Sequence Header (SH) is placed at the head of the video data in VU. The regeneration time of VU is defined as having applied the video frame cycle to the number of video frames contained in VU. The end of VU is filled up with 0 in order to double the always end of RU with an ECC block boundary, when it constitutes RU combining several ready VU.

[0052]The controlling method of the <AV stream controlling method> AV stream is using the above-mentioned QuickTime file format as the base. An AV stream management gestalt is shown in drawing 15. A video track manages the lump of the video in one sample (video sample) and VU for each video frame as one chunk (video chunk). A main audio track manages the lump of the audio in one sample (audio sample) and VU for AAU as one chunk (audio chunk).

[0053]<RU unit deciding method>, next RU unit deciding method are explained. In this deciding method, a continuous recording unit is decided that seamless reproduction does not fail on it supposing the device (reference device model) used as a standard.

[0054]Then, a reference device model is first explained using drawing 16. The ECC encoder decoder 501, the track buffer 502, the demultiplexer 503 and the buffer 504 for postrecording with which a reference device model is connected with one pickup at it, the audio encoder 509, the video buffer 505, It is constituted by the audio buffer 506, the video decoder 507, and the audio decoder 508.

[0055]The seamless reproduction in this model shall be guaranteed if at least one-piece VU exists on the track buffer 502 at the time of the decoding start of VU. Output speed of data is set to Rs from the entry-of-data speed and ECC decoders 501 to ECC encoder 501 of audio frame data.

[0056]The maximum term by access which is read and record stops is set to Ta. Time which short access (about 100 tracks) takes is set to Tk. Seek time, latency speed, and time until the data first read from the disk after access is outputted from ECC are contained in these periods. In this example, it may be Tk= 0.2 second for Rs=20Mbps, and Ta= 1 second.

[0057]If the following conditions are fulfilled when it reproduces in said reference device model, it can guarantee that there is no underflow of the track buffer 502.

[0058]Before conditions are shown, a sign is defined first. The i-th continuation field that constitutes an AV stream is made into C#i, and regeneration time included in C#i is made into Tc (i). Tc(i) is taken as the sum total of the regeneration time of VU in which the head is included in C#i. Access time from C#i to C#i+1 is set to Ta.

[0059]VU reading time for regeneration time Tc(i) is made into Tr(i). The conditions to which underflow of the track buffer 502 is not carried out at this time are [in / when the maximum reading time including a division jump is made into Tr(i) / arbitrary C#i] Tc(i)>=Tr(i)+Ta... It is that <the formula 1> is materialized.

[0060]Because, this formula is a sufficient condition of seamless reproduction, [0061]
[Equation 1]

$$\sum_i Tc(i) \geq \sum_i (Tr(i) + Ta)$$

[0062]It is because it is a ******** sufficient condition.

[0063]When Tr(i)=Tc(i)x(Rv+Ra)/Rs is substituted for Tr(i) in <the formula 1> and it solves by Tc (i), it is condition Tc(i)>=(TaxRs)/(Rs-Rv-Ra) of Tc(i) which can guarantee seamless reproduction... <The formula 2> is obtained.

[0064]That is, seamless reproduction can be guaranteed if it is made for the sum total of VU in which a head is included to each continuation field to fill an upper type. At this time, it may restrict to each continuation field so that total regeneration time may contain perfect VU group which fills an upper type.

[0065]It is necessary to fill <the formula 2> also with an automatic division movie file. However, RU of the beginning of a top automatic division movie and RU of the last of an automatic division movie of an end do not need to fill <the formula 2>. It is because a head does not have data which can absorb by delaying a reproduction start from a data read start from a recording medium, and follows the next about an end, so there is no necessity of caring about continuous reproduction. Thus, short free space can be used effectively by loosening conditions in a head and an end.

[0066]In order to manage various contents (it is henceforth called AV file) containing a QuickTime movie contained in a <index file> disk, still picture data, etc., a special QuickTime movie file called an AV Index file is placed into [one] a disk.

[0067]Composition of an AV Index file is shown in drawing 17. An AV Index file comprises Movie atom1791 and Movie data atom1792 of the data itself which are management information like the usual QuickTime movie file. An AV Index file manages two or more entries, and each AV file in a disk is managed by one entry, respectively. A receptacle (it is henceforth called a folder) for summarizing each AV file, etc. are managed by one entry, respectively.

[0068]Movie atom1791, Attribution information of each entry. Property for managing. track1793 and title character string data of each entry. Intro music for managing Thumbnail track1795 for managing Title track1794 for managing, and thumbnail image data of each entry, and representation audio information of each entry. It comprises a total of four kinds of tracks of track1796.

[0069]Attribution information about each entry is managed as a sample of each track of 1792-1795. As for attribution information about the AV file 1740, the sample 1701 on Property track1793 and title character string data the sample 1711 on Title track1794, and thumbnail image data For example, Thumbnail. The sample 1721 on track1795 and representation audio information are managed with the sample 1731 on Intro musictrack1796. Matching between samples is performed based on reproduction time of onset of each sample. That is, it is judged that a sample located between tracks at identical time supports the same entry.

[0070]Movie data atom1793 stores attribution information about each AV file, title character string data and thumbnail image data, and representation audio information. Attribution information takes composition shown in drawing 18. Each field is explained. version shows a version of a file format. pe-flags packs various flags and mentions them later for details.

[0071]Storing and entry-number store entry-number of an entry corresponding to attribution information for entry-number of an entry corresponding to a folder to which an entry corresponding to attribution information in parent-entry-number belongs. Inclusion relation of a file and a folder is expressed with this two information. Explanation is omitted about set-dependent-flags and user-private-flags.

[0072]creation-time and modification-time express a date on which an entry corresponding to this attribution information was created, and corrected time. duration expresses regeneration time of an entry corresponding to this attribution information. binary-file-identifier is what carried out encoding of the pathname of that file to fixed length when an entry corresponding to this management information supported a file, and explanation about details is omitted.

[0073]referred-counter stores the number of times by which a file which an entry corresponding to this attribution information manages is referred to from other files. referring file list stores a list of pathnames of a file actually referred to. URL file identifier is URL (Unified Resource Locator) form, when a file to manage cannot encode to above-mentioned binary-file-identifier, and it stores a path of a file.

[0074]About a 1st embodiment of <1st embodiment> this invention, processing in a case of performing non-destroying edit is explained using drawing 26 from drawing 19. As here shown in drawing 19, when there are the QuickTime files 2001 and 2002 in which an AV stream is stored, First, the file 2001 is reproduced to the frame 2021 in the GOP sequence 2051 in VU2011, next it assumes carrying out non-destroying edit which connects the file 2002 in the middle of GOP of reproducing from the frame 2022 in the GOP sequence 2052 in VU2012. Movie atom2041 and 2042 are the management information for reproducing the files 2001 and 2002, respectively.

[0075]Processing about an AV stream is explained first and processing about management information is explained below.

[0076]< non-destroying editing processing: Explain processing about an AV stream at the time of processing > non-destroying edit about an AV stream using drawing 20. VU2012 to the GOP sequence 2051 and the GOP sequence 2052 are extracted from the above-mentioned VU2011, and it decodes in the video frame sequences 2031 and 2032 by the video decoder 116, respectively.

[0077]Next, it encodes with the video encoder 116 from the partial video frame sequence 2033 to the video frame 2021 in the decoded video frame sequence 2031 (re-encoding), The GOP sequence 2053 is created and VU2013 is created by combining with the partial AAU sequence 2071 which is equivalent to the partial video frame sequence 2033 in time.

[0078]About the partial video frame sequence 2034 after the video frame 2022 in the decoded video frame sequence 2032, it encodes with the video encoder 116 simultaneously (re-encoding), The GOP sequence 2054 is created and VU2014 is created by combining with the partial AAU sequence 2072 which is equivalent to the partial video frame sequence 2034 in time. That is, two VU is created.

[0079]Although collecting into one VU instead of two VU is also considered at this time, it will constitute from two VU according to a reason for explaining below. A procedure in a case of collecting into one VU is shown in drawing 21. The partial video frame sequences 2033 and 2034 are combined, the video frame sequence 2035 is created, and VU2015 is created by combining the GOP sequence 2055 of a result of having encoded it, and the AAU sequence 2075 which is the result of connecting the partial AAU sequences 2071 and 2072.

[0080]As a problem in this case, a time crevice occurs in either an audio or video in a knot. Because, since the video frame cycle 2081 and the AAU cycle 2082 do not have a relation of an integral multiple as shown in drawing 22, When it is going to reproduce the partial video frame sequence 2083 and the partial video frame sequence 2084 without a time crevice, the crevice

2083 will be made in a knot of the partial AAU sequences 2071 and 2072.
[0081]Also in the case of two VU, this crevice 2083 is made, but processing may be complicated when a case where it moves per VU is considered, since the crevice 2083 occurs in the middle of VU when it is one VU. Therefore, it will constitute from two VU.
[0082]< non-destroying editing processing: Explain processing about management information at the time of processing > non-destroying edit about management information using drawing 23. First, information about VU sequence of a just before [Movie atom2041 to VU2011 of the file 2001] is acquired. Similarly, information about VU sequence after immediately after VU2012 from Sample table atom of Movie atom2042 of the file 2002 is acquired.
[0083]Next, on information required for Sample table creation, and a concrete target, data size, regeneration time, etc. of a video chunk and an audio chunk are acquired about VU2013 and VU2014 of the above-mentioned created newly. Sample table atom about a non-destroying edit result is reconstructed on RAM102 about a video track and each audio track based on those information.
[0084]Next, Edit list atom is constituted so that a sample in said Sample table atom may be reproduced without a crevice in order. However, about a knot of VU2013 and VU2014, correctly, VU2014 or subsequent ones needs to insert a non-reproducing section about an audio track as mentioned above so that AV synchronous reproduction may be possible. Movie atom2043 about a non-destroying edit result is created based on these information, and it collects into the file 2003 with VU2013 and VU2014. When recording the file 2003, it records being continuously arranged on a recording medium.
[0085]Thus, the following merits arise by summarizing management information about data and a non-destroying edit result which were re-encoded with non-destroying edit to one file. First, it is the point that an increase in the number of files is suppressed. That there are few files and it ends in such a file system since a maximum of the manageable number of files exists depending on a file system means that much contents are more recordable. In this embodiment, when recording the file 2003, it is recording continuously, but even if not continuous, it cannot be overemphasized that there is an effect of increase control in the number of files.
[0086]Although only VU (VU2011 and VU2012) containing a knot was extracted and being collected into the one file 2003 in this embodiment, Also extracting VU other than VU which contains a knot so that AV information in like [with a seamlessly refreshable non-destroying edit result] and the file 2003 may fill the above-mentioned <formula 2> is also considered.
[0087]It explains using drawing 24. VU2011 is contained in RU2101 and VU2012 presupposes that it is contained in RU2102. If regeneration time of the sum total of the VU sequence 2112 after the VU sequence 2103 in front of VU2011 contained in RU2101, VU2013 which were re-encoded, and VU2012 which are contained in VU2014 and RU2102 fills <the formula 2> at this time, The VU sequence 2103, VU2013, VU2014, and the VU sequence 2112 are stored in the file 2003 on a recording medium at continuation. If less than <the formula 2>, RU2103 which is RU in front of RU2101 will be copied. It enables it for the file 2003 to fill <the formula 2> and to guarantee seamless reproduction also about a non-destroying edit result by this.
[0088]When playback of the <processing at time of playback> non-destroying edit result file 2003 is directed, Movie atom2043 is first read from the optical disc 106 on RAM102. Based on information on read Movie atom, it reads from the optical disc 106 to the buffer 110 for playback at reproduction orders in order of the VU sequence 2091, VU2013, VU2014, and the VU sequence 2092 (order of (1) - (5) in drawing 25).
[0089]Based on information on Movie atom, AV information read to the buffer 110 for reproduction is divided into audio information and a video data by the demultiplexer 112, and is sent to the audio decoder 115 and the video decoder 116, respectively. The audio decoder 115 and the video decoder 116 are reproduced by taking a synchronization by control from the host CPU 101 based on information on Movie atom.
[0090]At this time, reading namely, carrying out in turn shown in (1) - (5) of drawing 26 in order of VU2013, VU2014, the VU sequence 2091, and the VU sequence 2092 is also considered. VU2013 and VU2014 are reproduced at the same time it holds data read from VU2013 and VU2014 to the buffer 110 for reproduction and reproduction of the VU sequence 2091 is

completed until reproduction of the VU sequence 2091 finishes since it is actually reproduced after the VU sequence 2091.

[0091]Since the number of times of seeking becomes fewer once by doing in this way as compared with a case where it reads to reproduction orders, power consumption of a motor accompanying seeking is reducible. By recording physically management information and re-encoding data of a non-destroying edit result continuously on a disk, an above-mentioned effect is realizable. If it is arranged in the neighborhood even if management information and re-encoding data of a non-destroying edit result are not continuing, it cannot be overemphasized that can realize same effect.

[0092]By the <2nd embodiment> book embodiment, an original data file is not affected but processing which applies an effect to the partial section is explained using drawing 27. Here, original data are stored in the file 2201 and it assumes applying an effect (for example, mosaic) to the section 2221.

[0093]At this time, a GOP sequence in the RU sequence 2232 including the section 2221 is decoded, an effect is given to a specified interval to generated incompressible video frame data, it encodes to an effect result, and the RU sequence 2234 is reconstructed. The RU sequence 2234 is stored in the one file 2202 with Movie atom2212.

[0094]Management information is stored in Movie atom2212 so that it may reproduce in order of the RU sequence 2231, the RU sequence 2234, and the RU sequence 2233. The RU sequence 2234 is recorded [being continuously arranged on a recording medium, and].

[0095]It becomes possible to apply an effect to the partial section by the above composition, without moreover copying all original data, without affecting an original data file only by increasing one file like a 1st embodiment mentioned above. Since data stored in the file 2202 is taking RU into consideration, it is possible for an effect result to also guarantee seamless reproduction. In this embodiment, when recording the RU sequence 2234, it is recording continuously, but even if not continuous, it cannot be overemphasized that there is an effect of increase control in the number of files.

[0096]By the <3rd embodiment> book embodiment, original data are not affected but processing which performs audio after recording (postrecording) is explained using drawing 28. Here, the original data 2321 are stored in the file 2301, and it assumes postrecording to the arbitrary sections.

[0097]At this time, the audio information 2322 inputted at the time of postrecording is stored in the file 2302 with Movie atom2312. Management information is stored in Movie atom2312 so that synchronous reproduction of the original data 2321 and the audio information 2322 may be carried out. Movie atom2312 and the audio information 2322 record being continuously arranged on a recording medium.

[0098]It becomes possible to manage postrecording data, without affecting original data only by increasing one file like a 1st embodiment mentioned above by the above composition. In this embodiment, when recording Movie atom2312 and the audio information 2322, it is recording continuously, but even if not continuous, it cannot be overemphasized that there is an effect of increase control in the number of files.

[0099]By arranging Movie atom2312 and the audio information 2322 continuously on a recording medium, Since it can read continuously, without seeking Movie atom2312 and the audio information 2322, Synchronous reproduction of the audio information 2322 and the original data 2321 becomes possible, without performing seeking to the audio information 2322 during reproduction further, without requiring time until reproduction is actually started from reproduction instruction from a user.

[0100]

[Effect of the Invention]As explained above, according to this invention, by storing in the same file as the management information of a non-destroying edit result the data re-encoded at the time of non-destroying edit, an original data file is not rewritten but it becomes possible to suppress the increase in the number of files only to one piece moreover.

[0101]According to this invention, it becomes possible to decrease access at the time of reproduction by recording the data re-encoded at the time of non-destroying edit on the neighborhood on the management information of a non-destroying open edit result, and a recording medium.

[Translation done.]

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a block diagram showing the outline composition in the embodiment of this invention.
[Drawing 2]It is an explanatory view showing the relation of the management information and the AV stream in a QuickTime file format.
[Drawing 3]It is an explanatory view showing the outline of Movie atom in a QuickTime file format.
[Drawing 4]It is an explanatory view showing the outline of Track atom in a QuickTime file format.
[Drawing 5]It is an explanatory view showing the composition of Track header atom in a QuickTime file format.
[Drawing 6]It is an explanatory view showing the composition of Media atom in a QuickTime file format.
[Drawing 7]It is an explanatory view showing the composition of Media information atom in a QuickTime file format.
[Drawing 8]It is an explanatory view showing the example of the data management by Sample table atom.
[Drawing 9]It is an explanatory view showing the composition of Sample table atom in a QuickTime file format.
[Drawing 10]It is an explanatory view showing the composition of Edit atom in a QuickTime file format.
[Drawing 11]It is an explanatory view showing the example of the reproduction range specification by Edit atom.
[Drawing 12]It is an explanatory view showing the composition of User data atom in a QuickTime file format.
[Drawing 13]It is an explanatory view showing the composition of the AV stream in this invention.

[Drawing 14]It is an explanatory view showing the structure of VU in this invention.
[Drawing 15]It is an explanatory view showing the AV stream management gestalt in this invention.
[Drawing 16]It is an explanatory view showing the reference device model in this invention.
[Drawing 17]It is an explanatory view showing the composition of AV Index in this invention.
[Drawing 18]It is an explanatory view showing the composition of the attribution information in AV Index in this invention.
[Drawing 19]It is an explanatory view in a 1st embodiment of this invention showing the conditions of non-destroying edit.
[Drawing 20]It is an explanatory view in a 1st embodiment of this invention showing the 1st re-encoding method.
[Drawing 21]It is an explanatory view in a 1st embodiment of this invention showing the 2nd re-encoding method.
[Drawing 22]It is an explanatory view in a 1st embodiment of this invention showing the time

mismatching between the audio videos of a knot.
[Drawing 23]It is an explanatory view in a 1st embodiment of this invention showing the 1st controlling method of a non-destroying edit result.
[Drawing 24]It is an explanatory view in a 1st embodiment of this invention showing the 2nd controlling method of a non-destroying edit result.
[Drawing 25]It is an explanatory view showing the 1st order of read-out at the time of the regeneration in a 1st embodiment of this invention.
[Drawing 26]It is an explanatory view showing the 2nd order of read-out at the time of the regeneration in a 1st embodiment of this invention.
[Drawing 27]It is an explanatory view in a 2nd embodiment of this invention showing the controlling method of a non-destroying edit result.
[Drawing 28]It is an explanatory view in a 3rd embodiment of this invention showing the controlling method of a postrecording result.
[Drawing 29]It is an explanatory view showing the re-encoding method in conventional technology.
[Drawing 30]It is an explanatory view showing the controlling method of the non-destroying edit result in conventional technology.
[Description of Notations]
100 Bus
101 Host CPU
102 RAM
103 ROM
104 User interface
105 System clock
106 Optical disc
107 Pickup
108 ECC decoders
109 ECC encoder
110 The buffer for reproduction
111 The buffer for record/postrecording
112 Demultiplexer
113 Multiplexer
114 The buffer for multiplexing
115 Audio decoder
116 Video decoder
117 Audio encoder
118 Video encoder

[Translation done.]

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damages caused by the use of this translation.

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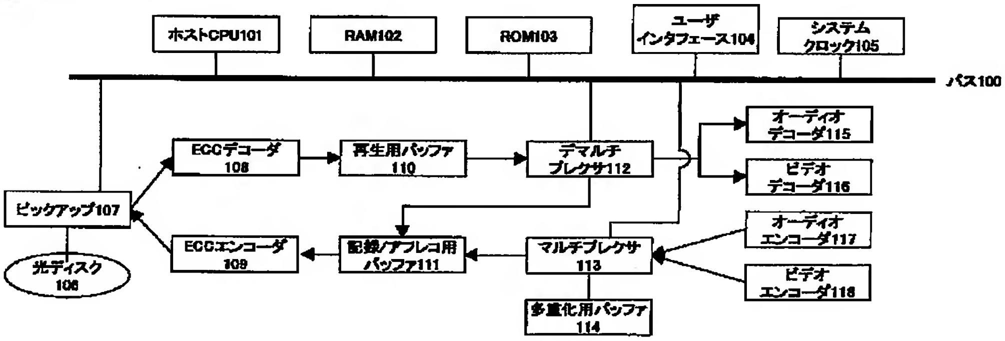
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

[Drawing 1]


ホストCPU101
RAM102
ROM103
ユーザ インタフェース104
システム クロック105
バス100
オーディオ デコーダ115
ECCデコーダ 108
再生用バッファ 110
デマルチ プレクサ112
ビデオ デコーダ116
ピックアップ107
オーディオ エンコーダ117
光ディスク 106
ECCエンコーダ 109
記録/アフレコ用 バッファ111
マルチプレクサ 113
ビデオ エンコーダ118
多重化用バッファ 114

[Drawing 3]

```
Movie atom {
          Atom size
          Type(='moov')
          Movie header atom
          Track atom (video track)
          Track atom (main audio track)
                    :
          User data atom
}
```

[Drawing 4]

```
Track atom {
          Atom size
          Type(='trak')
          Track header  atom
          Edit atom
          Track reference atom
          Media atom
          User data atom
                    :
}
```

[Drawing 5]

```
Track header atom {
        Atom size
        Type(='tkhd')
        Version
        Flags
        Creation time
        Modification time
        Track ID
        Reserved
        Duration
        Reserved
        Layer
        Alternate group
        Volume
        Reserved
        Matrix structure
        Track width
        Track height
}
```

[Drawing 6]

```
Media atom {
        Atom size
        Type(='mdia')
        Media header  atom
        Handler reference atom
        Media information atom
        User data atom
                  :
}
```

[Drawing 7]

```
Media information atom {
        Atom size
        Type(='minf')
        {Video or Sound or Base} media information header atom
        Handler reference atom
        Data information atom
        Sample table atom
}
```

[Drawing 8]

```
Sample table atom {
        Atom size
        Type(='stbl')
        Sample description atom
        Time-to-sample atom
        Sync sample atom
        Sample-to-chunk atom
        Sample size atom
        Chunk offset atom
}
```

[Drawing 10]

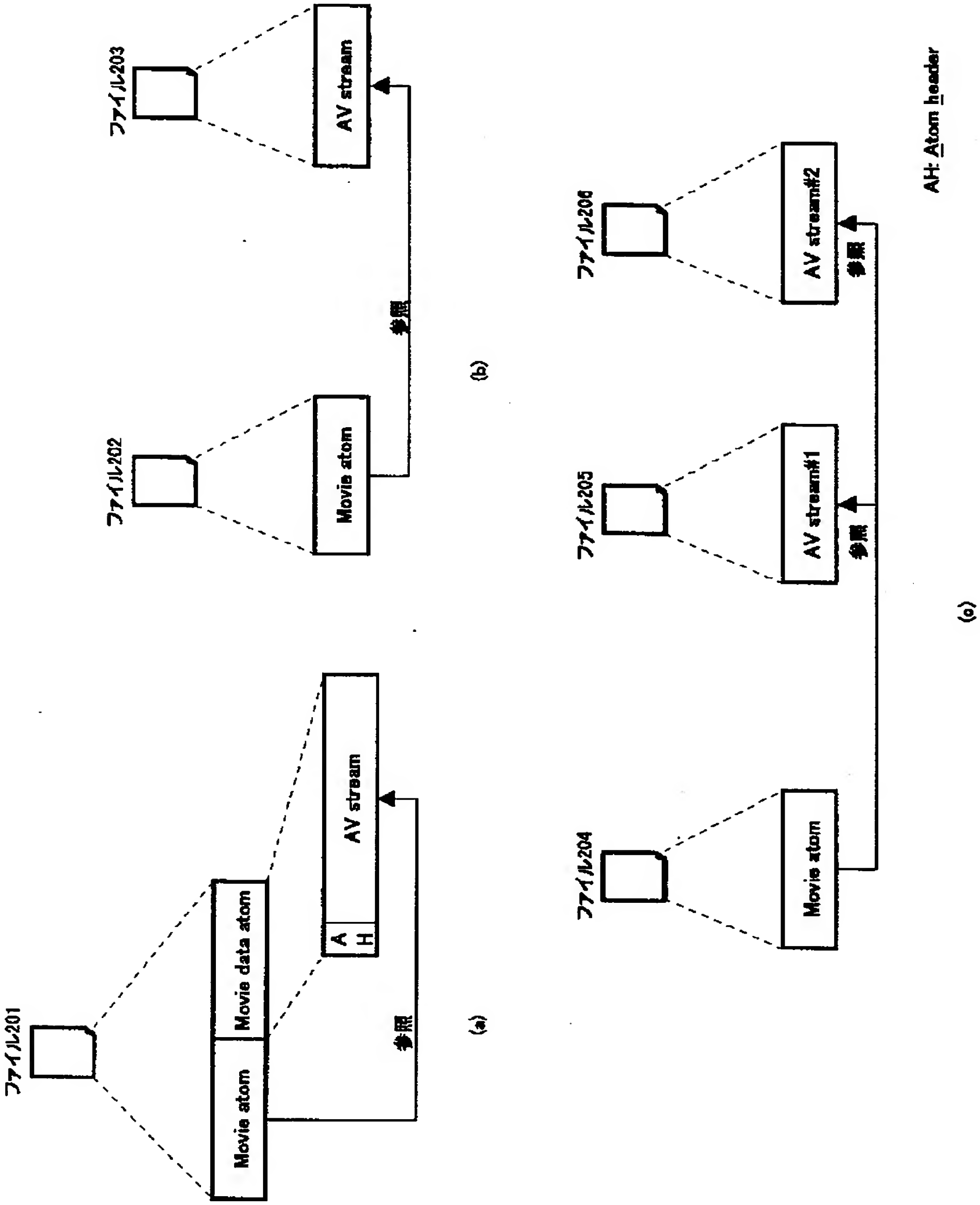
```
Edit atom {
        Atom size
        Type(='edts')
        Edit list atom
}

Edit list atom {
        Atom size
        Type(='elst')
        Versions
        Flags
        Number of entries(=N)
        for (i = 0; i < N; i++){
                Track duration
                Media time
                Media rate
        }
}
```

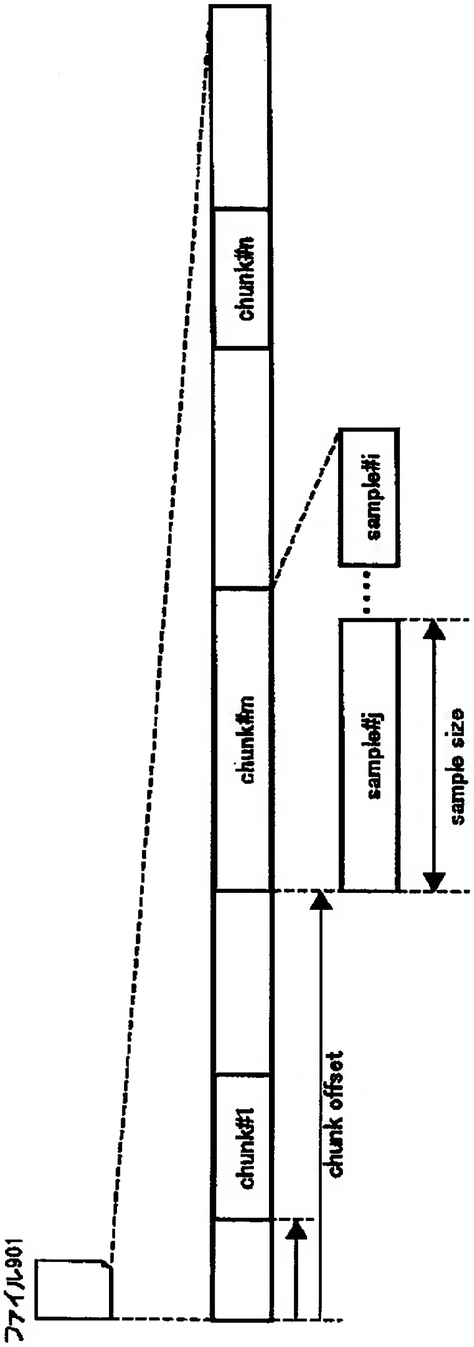
[Drawing 12]

```
User data atom {
        Atom size
        Type(='udta')
        for (i=0;i<N; i++){
                Atom size
                Type
                User data
        }
}
```

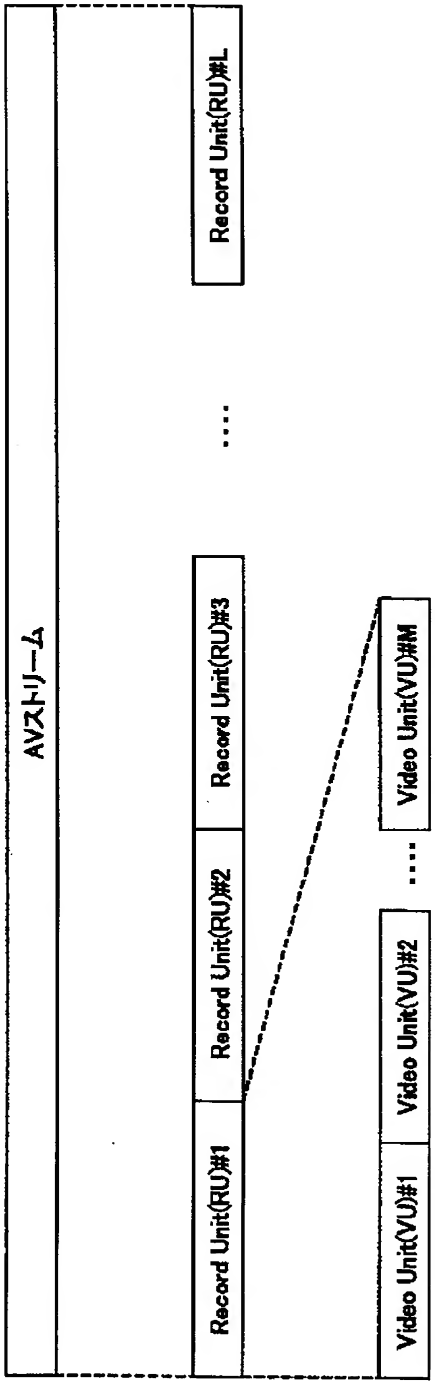
[Drawing 2]


ファイル201
Movie atom
Movie data atom
A H
AV stream
参照
(a)
ファイル202
Movie atom
ファイル203
AV stream
参照
(b)
ファイル204
Movie atom
ファイル205
AV stream#1
参照
ファイル206
AV stream#2
参照
(c)
AH: Atom header

[Drawing 9]


ファイル901
chunk#1
chunk#m
chunk#n
sample#j
sample#i
sample size
chunk offset

[Drawing 13]

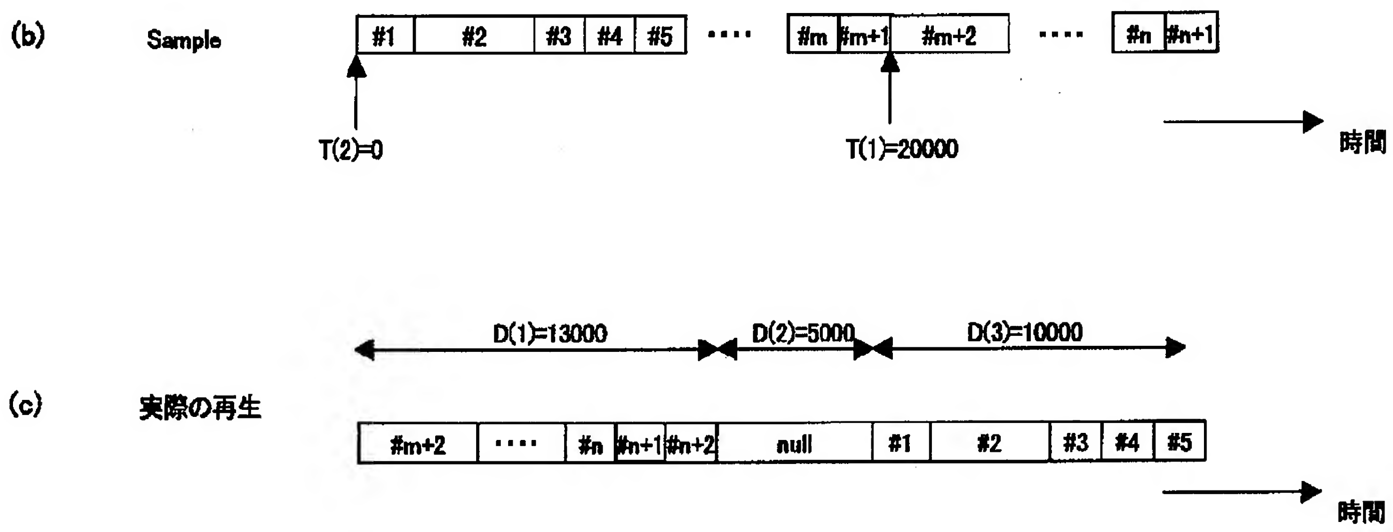

AVストリーム
Record Unit(RU)#1
Record Unit(RU)#2
Record Unit(RU)#3
....
Record Unit(RU)#L
Video Unit(VU)#1
Video Unit(VU)#2
....
Video Unit(VU)#M

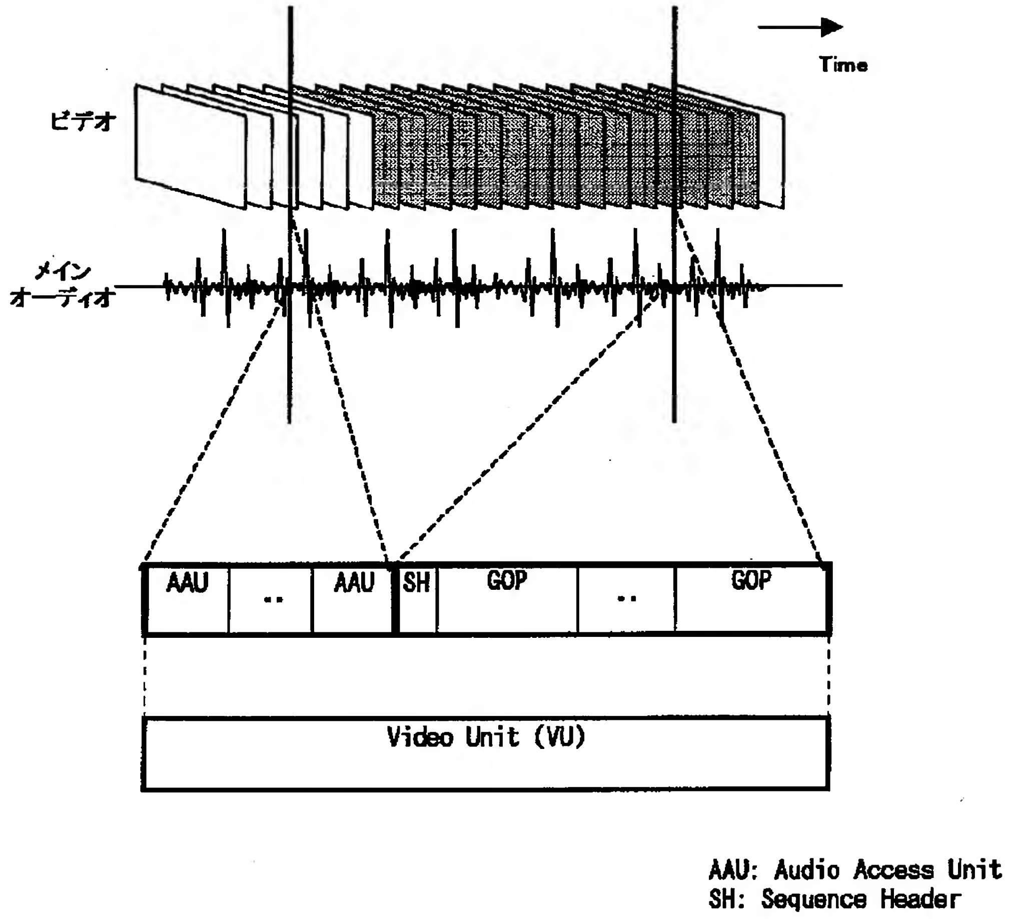
[Drawing 11]

[Drawing 14]

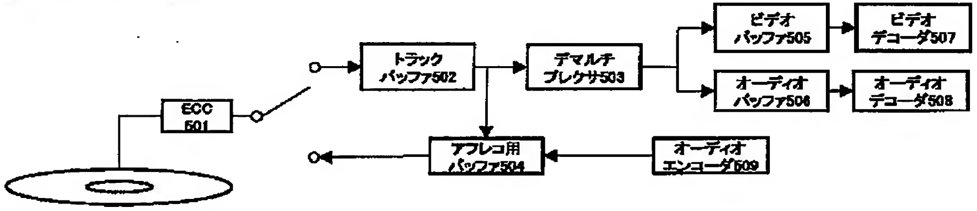
(a)

Entry Number	Track duration D(i)	Media time T(i)	Media rate R(i)
#1	13000	20000	1
#2	5000	-1	1
#3	10000	0	1

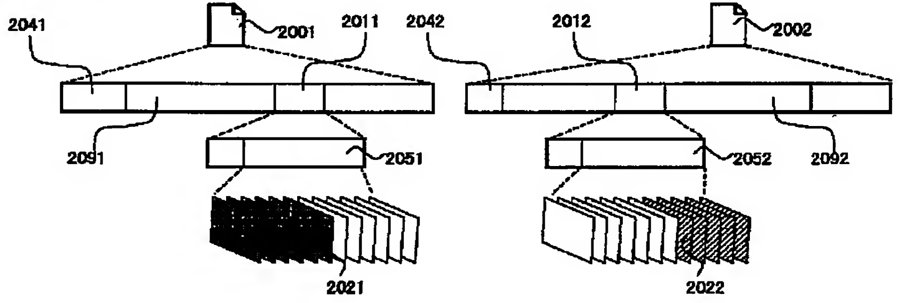

(b)
Sample
#1
#2
#3
#4
#5
....
#m
#m+1
#m+2
....
#n
#n+1
T(2)=0
T(1)=20000
時間
(c)
実際の再生
D(1)=13000
D(2)=5000
D(3)=10000
#m+2
....
#n
#n+1
#n+2
null
#1
#2
#3
#4
#5
時間


Time
ビデオ
メイン
オーディオ
AAU
..
AAU
SH
GOP
..
GOP
Video Unit (VU)
AAU: Audio Access Unit
SH: Sequence Header

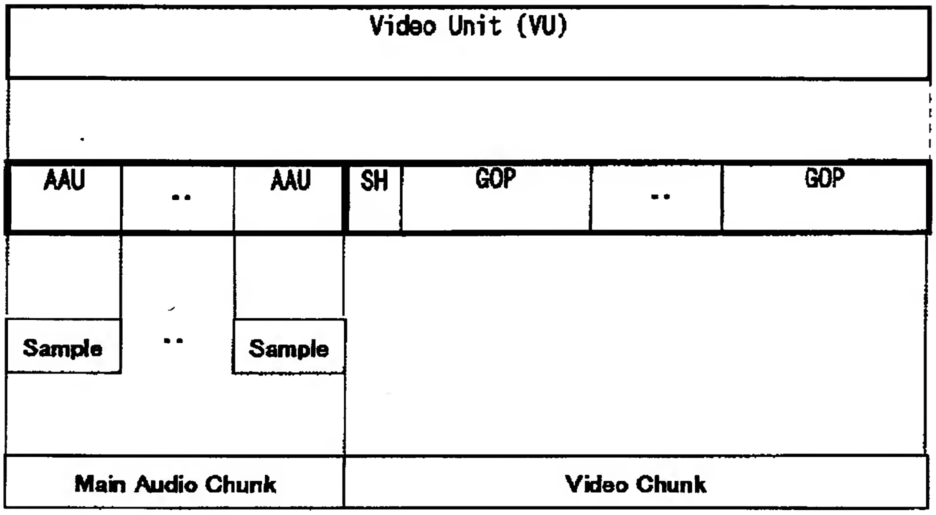
[Drawing 16]


ECC 501
トラック バッファ502
デマルチ プレクサ503
ビデオ バッファ505
ビデオ デコーダ507
オーディオ バッファ506
オーディオ デコーダ508
アフレコ用 バッファ504
オーディオ エンコーダ509

[Drawing 19]


2041
2001
2011
2042
2012
2002
2091
2051
2052
2092
2021
2022

[Drawing 15]

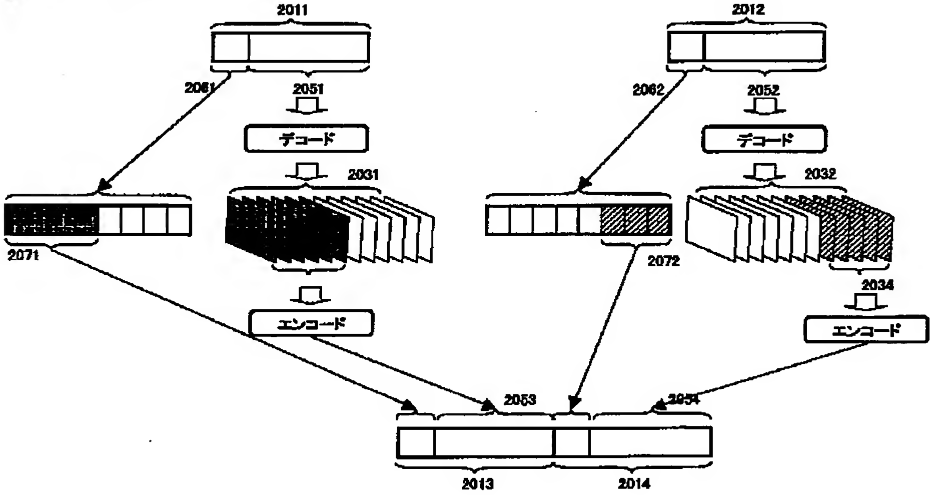

Video Unit (VU)
AAU
..
AAU
SH
GOP
..
GOP
Sample
..
Sample
Main Audio Chunk
Video Chunk

AAU: Audio Access Unit
GOP: Group Of Pictures
SH: Sequence Header

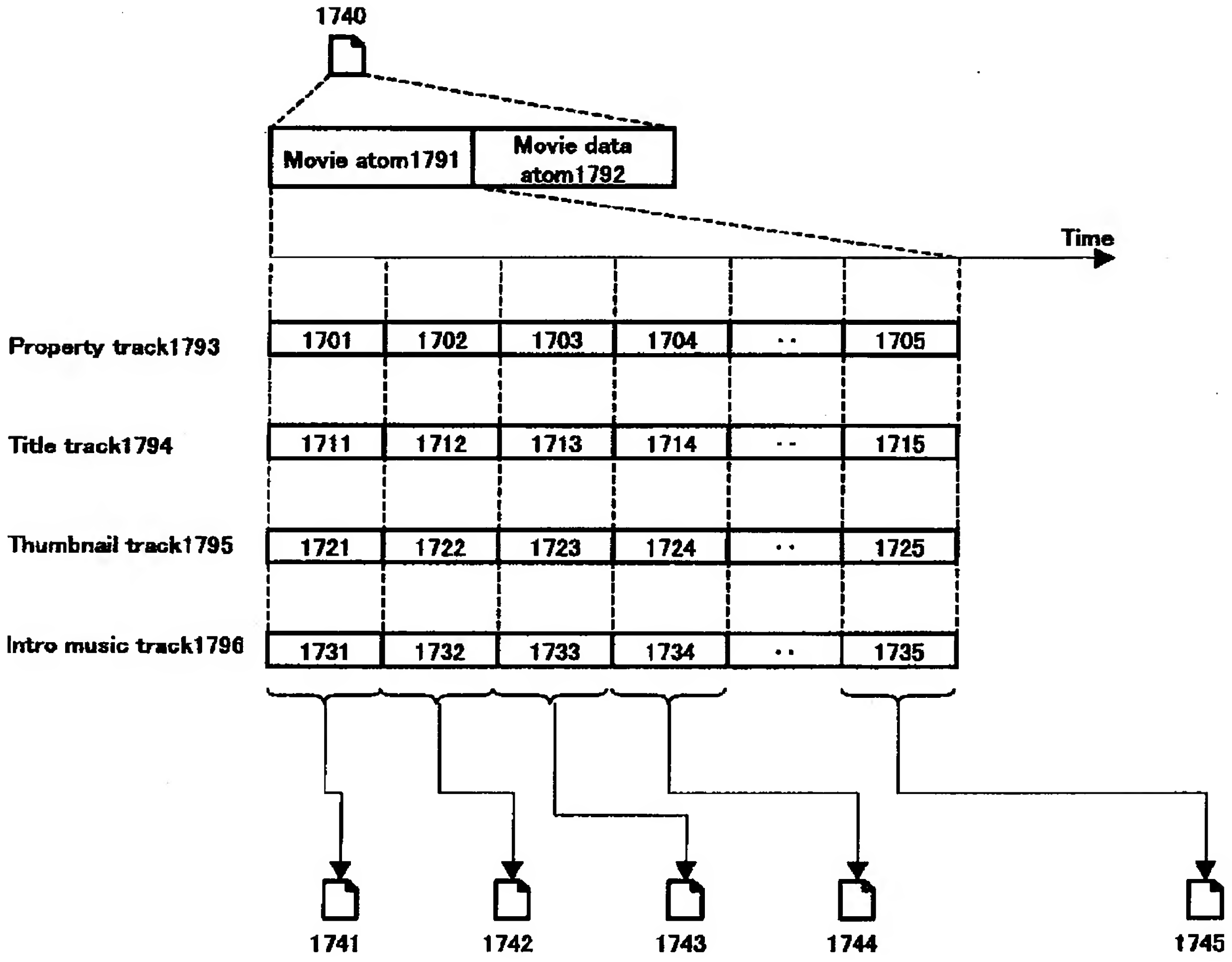
[Drawing 18]

```
Property Entry {
        version
        pe-flags
        parent-entry-number
        entry-number
        set-dependent-flags
        user-private-flags
        reserved
        creation-time
        modification-time
        duration
        binary-file-identifier
        referred-counter
        referring file list
        URL file identifier
}
```

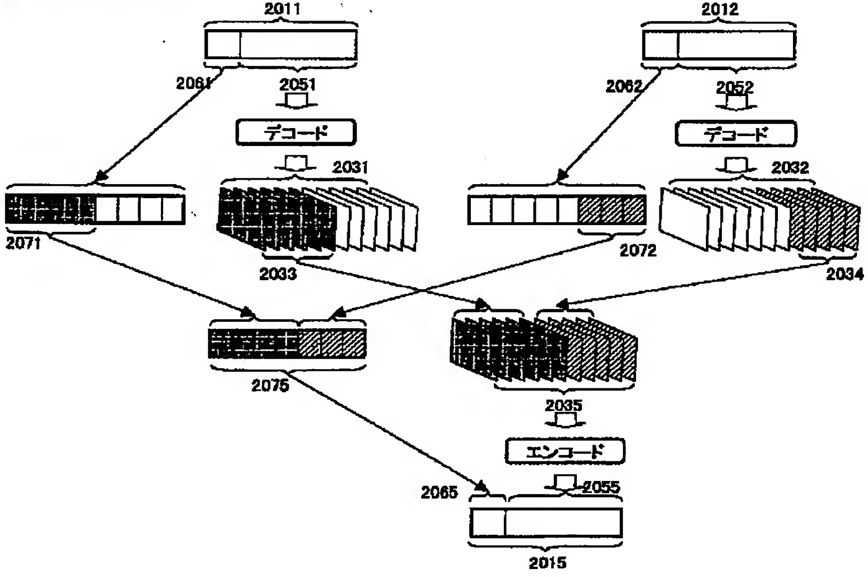
[Drawing 20]


2011
2012
2061
2051
2062
2052
デコード
デコード
2031
2032
2071
2072
2034
エンコード
エンコード
2053
2054
2013
2014

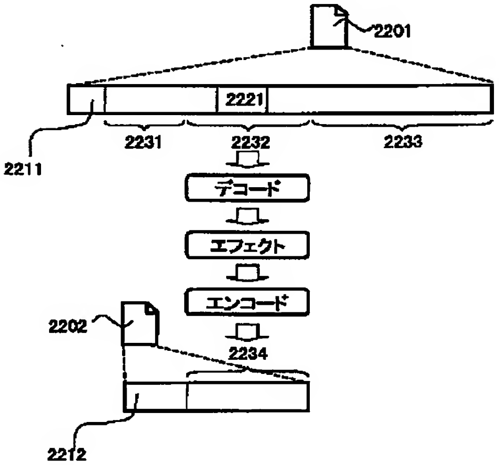
[Drawing 17]


1740
Movie atom1791
Movie data atom1792
Time
Property track1793
1701
1702
1703
1704
・・
1705
Title track1794
1711
1712
1713
1714
・・
1715
Thumbnail track1795
1721
1722
1723
1724
・・
1725
Intro music track1796
1731
1732
1733
1734
・・
1735
1741
1742
1743
1744
1745

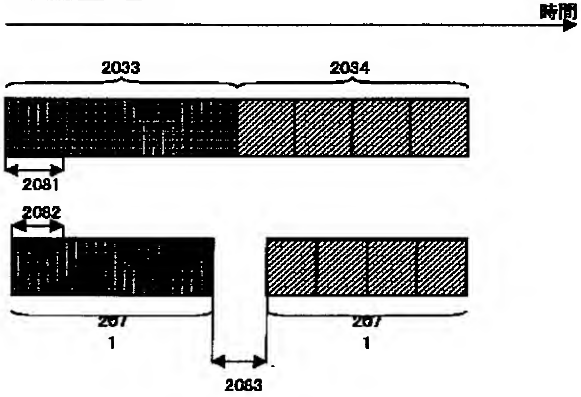
[Drawing 21]


2011
2012
2061
2051
2062
2052
デコード
デコード
2031
2032
2071
2033
2072
2034
2075
2035
エンコード
2065
2055
2015

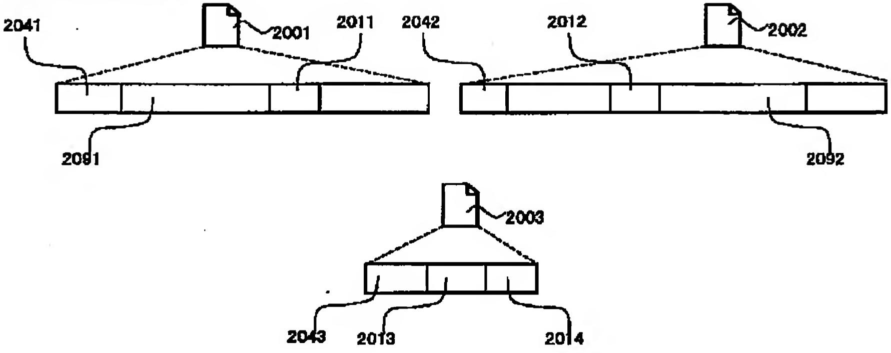
[Drawing 27]


2201
2221
2211
2231
2232
2233
デコード
エフェクト
エンコード
2202
2234
2212

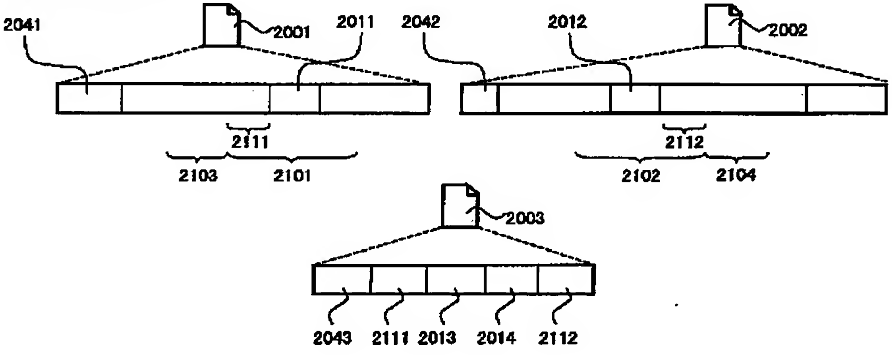
[Drawing 22]


時間
2033
2034
2081
2082
2071
2071
2083

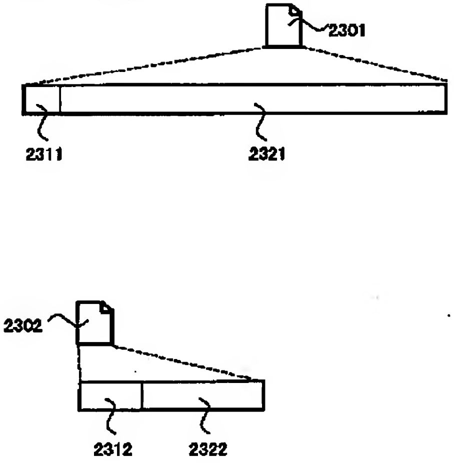
[Drawing 23]


2041
2001
2011
2042
2012
2002
2091
2092
2003
2043
2013
2014

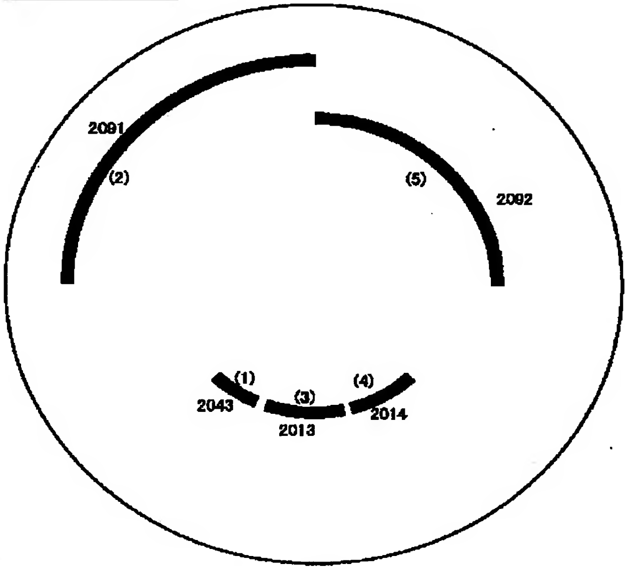
[Drawing 24]


2041
2001
2011
2042
2012
2002
2111
2103
2101
2112
2102
2104
2003
2043
2111
2013
2014
2112

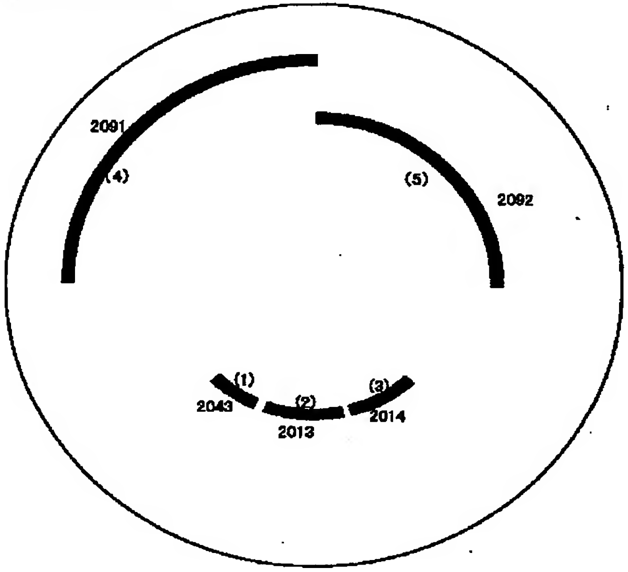
[Drawing 28]


2301
2311
2321
2302
2312
2322

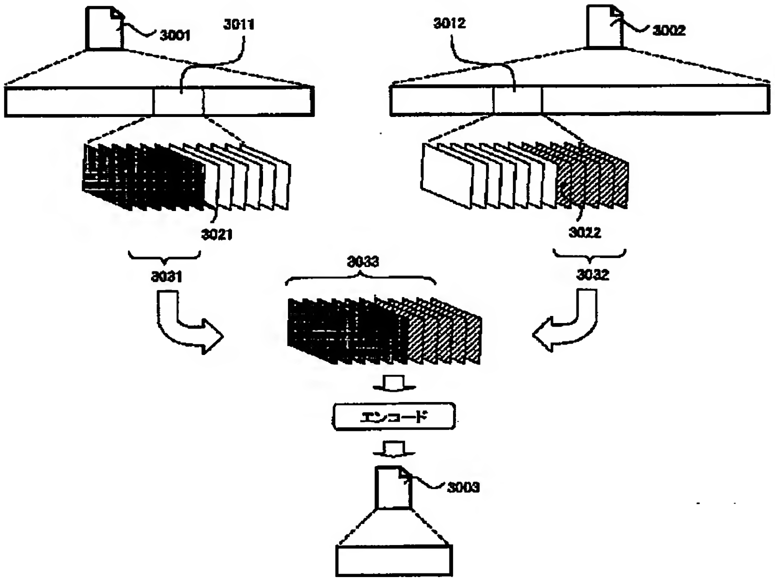
[Drawing 25]


2091
(2)
(5)
2092
(1)
(4)
2043
(3)
2014
2013

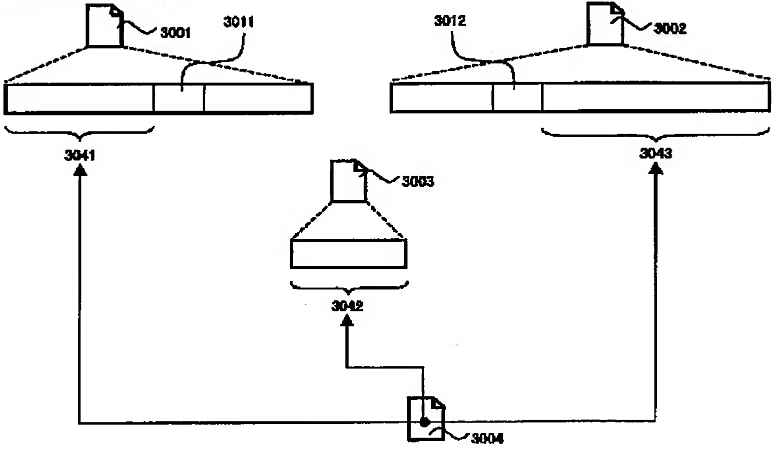
[Drawing 26]


2091
(4)
(5)
2092
(1)
(3)
2043
(2)
2014
2013

[Drawing 29]


3001
3011
3012
3002
3021
3022
3031
3033
3032
エンコード
3003

[Drawing 30]


3001
3011
3012
3002
3041
3043
3003
3042
3004

[Translation done.]